SUPPLEMENT TO
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MISCELLANEOUS PAPERS.

THE FOLLOWING LETTER ON THE FOREST PLANTATIONS OF THE WESTERN COASTS IN THE MADRAS PRESIDENCY IS PUBLISHED FOR GENERAL INFORMATION.

From the Conservator or Forests, Central Provinces. To the Secretary to Chief Commissioner, Central Provinces, No. A. 2.—Dated Camp, 26th May 1867.

I have the honor to report that in obedience to instructions contained in your letter No. 971-91 of 16th March 1867, I proceeded to visit Bombay to report on the saw machinery required for the Central Provinces' forests, and thence to visit the forests and fuel plantations on the West Coast.

2. The report on saw machinery has been already furnished.

Fuel plantations

3. As regards fuel plantations,—having 3 or 4 spare days in Bombay, waiting for a steamer,—I went up the Bombay and Baroda Railway to inspect the Baubul and Teak plantations on that Line, and to pick up any information about them that I was able.

4. This line of Railway is raised on a highish bank almost all the way, and I find that the Baubul seed was sown on the bank, principally for a general protection, and with a view of preventing it being washed away : as far as Surat from Bassein a very wide space was also taken up (in places at least 100 feet in breadth) on each side of the Line (the lands being generally waste) and sown with Baubul in the same manner.

5. The seed was steeped in water and then sown in shallow furrows about one foot apart, and the rapid growth of these trees generally, which have had little or nothing done for them, augurs well for the success of our fuel plantations in Wurdah. But I observed that most of the best grown trees were those which had taken root in the bank itself and had soft earth to strike into. Some of the trees on the side of the raised bank of the Line are from 2 to 3 feet in girth and 20 to 30 feet in height, after ten year's growth.

6. It is hardly thought probable that these Baubul trees will be of much use as Railway fuel, except in an emergency,—in case the coal supply is cut off by an accident to the great bridges, or from any other cause. It will not pay to cart the wood far along the side of the Line, and it would not be safe to have trucks or lorries standing on the Railway itself.

7. Mr. White, Chief Engineer, Bombay and Baroda Railway, under whose superintendence this Baubul was sown, writes to me as follows, (Mr. White prefers the country seed to the Scinde seed, both having been tried):—"we intended it for fuel, but it is doubtful if the plan is a remunerative one; when the wood is cut it requires close watching and is expensive to collect."

8. From thence I proceeded to Calicut. As

regards the supply of fuel to the Railway in Madras, I find that no regular plantations have been as yet formed. Jungle wood is cut from the forests bordering on the Line, which partly belong to Government and partly to private individuals. The latter seem to be fast vanishing.

9. To meet the requirements of the Railway it has been decided to fence off effectually with stone walls and trenches large tracts of forest near the Line, so as to keep all cattle out of them and also as a protection against fire; this is now being done. Any bare or thin patches will be covered, partly by sowing seed broadcast, and partly by planting out from nurseries. But Captain Beddome is of opinion that they must mainly depend on fencing off the jungle and excluding fire from it for its reproduction. These fuel preserves are to be made on the North West Line near Cudapah, and on the South West Line near Salem. The Palghat valley was also selected; but the land is now believed not to be available. But, as in the Central Provinces, the work is now only being commenced, and no actual experience has been gained as to how far such plantations will answer in a financial point of view. The Forest department, however, have made a large revenue from the sale of fuel cut from the jungles and sold to the Railway. Unfortunately our jungles are not sufficiently near the Line to make this a remunerative operation with us. It is intended that the firewood Reserves which are now being formed in Madras shall be worked on the coppice principle, —a portion being entirely cleared by rotation in each year, and renewed again by natural reproduction.

10. Meeting the Deputy Conservator of the Annamullai Range at Palghat, I had the advantage of visiting these well known forests in his company, and observing the system of conservancy and working followed in the Madras Presidency.

Annamullai forests.

11. I next visited the Australian plantations on the Neilgherries. These plantations (both of *Eucalyptus* and of the Australian acacias) are most flourishing and cannot but elicit from any one who sees them the highest praise for the excellent system on which they have been set on foot and which is carried out in keeping them up. They are intended to supply both fuel and building timber to these Hills, and are of very large extent. One plantation near Coonoor of 130 acres and of about 1 years' growth, contains many trees of from 40 to 50 feet high and 3 feet girth. It would be difficult to find such a noble forest of planted trees the same age in any part of the world. Large plantations are being formed near Wellington, and also in some of the old sholas *west of Ootacamund. The plan pursued with these plantations is very simple. The seed is sown in nursery beds and well watered till it springs up. When the seedlings are from 6 to 18 inches high they are taken out and the roots of each packed in moss, or better still, in pots formed of one joint of the large Kuttung bamboo. They are then replaced in the nurseries and watered every day till they are from 2 to 3 feet high, when during the rainy weather they are planted out in trenches 6 feet apart and 18 inches square filled with surface earth and any decayed vegetable matter: after planting out, the young trees are left to themselves; growing close together, they keep each other straight and clear of side branches. During the first 2 or 3 years very rapid progress is not observable, but after that period, having obtained a good hold, their growth is rapid to a degree which can scarcely be credited, so that by the time that an age of 10 years is attained, they form a noble plantation, pleasant to look at, and exceedingly profitable from the necessary thinnings, both for building purposes and for firewood. No doubt the climate has done much to procure these admirable results, but much also must be due to the excellent system of planting which was instituted by Dr. Cleghorn from the commencement of the plantations.

Plantations of Australian trees.

12. From thence I proceeded to study the Cinchona and its cultivation at Ootacamund. The two principal species cultivated on the Neilgherries, are the red barks and the yellow barks. I do not despair that we may succeed with the red barks on some of our higher plateaus. There can be no doubt that the proper plan is to endeavour to raise the plants from seed in the climate where they are eventually to grow. I have carefully observed the process of rearing them in every stage, both in the Government gardens under Mr. McIvor, and in the private plantations on the

Cinchona cultivation.

* Shola is a well known word all over the Neilgherry hills. It signifies a patch of forest, such as is found in most valleys and re-entering angles of the hills in the Neilgherry, Palghat, and Kondun ranges.

Neilgherries. The best system seems to be as follows :—

The seed is sown in pots, scattered at the top of equal parts of sand and black mud; in some cases they sow in pure brickdust, and a drain tile may be placed half way down the pot, so that no water may remain about the seed and rot it. In the Government gardens they water during the day every 3 or 4 hours, but less in the private plantations referred to. After the seeds have germinated a few days, they should be transplanted with a little wooden fork (like ———<) into other pots filled with equal parts of sand, brickdust, and black mud, and watered twice a day. The little seedlings must be looked to also carefully every morning, to see that they are not mildewed. They may remain in these pots till they get 4 or 6 leaves each, being kept in glass houses or under frames, with a temperature not exceeding 90° nor below 60°. When the seedlings have attained this size (*i. e.* 4 to 6 leaves opposite) they should be planted out into nursery beds. These beds should be composed of the same soil as that in which the trees will eventually have to grow, but perfectly cleaned of all grass and weeds. The young plants should be well shaded in the beds with ferns, and watered carefully every day. The pits for planting out may now be prepared. They should be 2 feet square and 7 feet apart. After digging out the pits they should be filled in again with the surface earth, which must be most carefully cleaned from all grass and weeds. As soon as the rains commence the seedlings, which should be at least 3 or 4 inches high, must be planted out into the pits. They may be sheltered with a little grass or with bamboo tatties, but get no water after planting out, and take their chance like any other trees. In one year after planting out, the yellow barks seemed to be on an average about a foot high; in the second year they gain about two feet more; and in the third year they seem to be thoroughly established and generally to have attained a height of 5 or 6 feet.

13. It will be best in the Central Provinces to sow the seeds during rains. They may then be planted into the nursery beds at the end of the year, and should be ready to plant out in pits as soon as the rains fall in June. If the rains are not regular at first the young plants would, no doubt, require water. And this perhaps would be the greatest drawback to having large plantations in the Central Provinces; for with really large plantations the expense of watering would render the experiment simply impracticable; and in this respect, even in Madras, it is that the Western Coast has such an enormous advantage for planting operations over the Eastern. Here, where hot winds are unknown, plantations thrive of themselves, with almost no care bestowed on them; while in Cudapah, in spite of every care and precaution, no plantation, as I am told, seems to come on satisfactorily. I fear the same dryness of atmosphere and high temperature will be a great obstacle to success in our Provinces, but it is no less incumbent on us to make the attempt. I should add that here to aid in keeping the moisture in the earth, grass or ferns are strewed around the pits after the young seedlings are planted in them.

14. In some cases trenches 18 inches deep and of the same width, are adopted. This plan is more expensive than pits, but is in many respects better; and the young trees which were planted in trenches seem to me to be in the best condition.

15. From Ootacamund I proceeded to the Government Cinchona plantations at Neddawuttum, which looked down on Wynad, about 6,400 feet above sea level. The seedlings planted out here are, however, all reared in the propagating houses at Ootacamund. They are chiefly of the larger species (or crown or yellow bark) and the larger trees now at five years average from 18 to 20 feet in height, one measuring 22 feet. All are in splendid order, and appear remarkably healthy.

16. From Neddawuttum I passed through Wynad, where I had the advantage of picking up some useful hints in planting and pruning on two coffee estates which I visited by the way, and so reached the Nellamboor teak plantations by the Karkoorghat—and here I cannot help adverting to the noble evergreen forests which clothe the slopes of the western mountains. Here it is common to see trees of the wild Jack and Poon spars, as well as other timbers of the best quality, which considerably exceed 100 feet to the first branch, perfect giants of the forest, with straight and even boles, which would yield fully 100 sleepers each. When the roads which are now being constructed are opened, and with water carriage available from almost the foot of the hills, I should think that an almost unlimited supply of Railway sleepers might be obtained here (even for the East Indian Rail-

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way) at a price far below what we could furnish them from the great Saul belt of Chutteesgurh, with its long land carriage. I have never seen anything to compare with the noble appearance of these truly magnificent forests.

17. I shall now proceed to give a short description of the Teak plantations at Nellamboor

18. These plantations were commenced by the late Mr. Conolly (Collector of Malabar) in the year 1844. They have been since carried on regularly, at first at the rate of 100 acres per annum, but this rate had dwindled down to 60 acres, when the present Officer, Mr. Ferguson, took charge in 1863, since which date upwards of 100 acres have been planted annually. Last year 130 acres were accomplished, and this year about the same amount of ground is being prepared.

Nellamboor teak plantations.

19. The first plantations are now 23 years old. Many of the trees in this plantation average 5 feet in girth at 6 feet from the ground, and I measured one tree of full 5 feet 4 inches in girth. The average height of the trees here is from 80 to 90 feet, and the length of log which these trees will yield will be at least 70 feet.

20. In plantations of five years later growth (17 or 18 years of age) I found the trees nearly as high, but of less girth. In plantations formed last year (in 1866) there were numerous saplings 8 feet high in plantations two years old; they certainly averaged from 14 to 16 feet in height, and 8 inches in girth; and in the three-year old plantations (which are remarkably fine) the trees were full 24 feet high, and from 12 to 15 inches in girth—all the plantations are of course not equally forward, but there is not a single one which by itself elsewhere would not be looked on as magnificent.

21. The plan pursued by Mr. Ferguson, the Assistant Conservator in charge, is exceedingly simple; but the admirable results obtained, in my judgment (if I may be permitted to say so) reflect the highest credit on his ability as a Forester, as well on his perseverance and personal supervision of all the operations, which must indeed entail an immense amount of the severest physical exertion, extending, as the plantations do, for six miles along the Nellamboor river. Briefly, the operations are as follows:—

At the close of the south-west monsoon, in September, the timber on the site selected for planting operations during the ensuing year (which is always forest land and that on which teak has not grown previously) is felled, and when dry in April and May is burned. Meanwhile nurseries of about half an acre in extent, sufficient to rear two lacs of seedlings are formed near the river, and the seed sown about the 10th of April. The seed is soaked for 24 hours in cold water before sowing, and when sown is covered very lightly with earth. Paddy straw is placed over the beds (which have a raised margin, so as to retain the water to the depth of 2 inches, and the beds are then copiously watered daily. The seeds germinate in from 12 to 16 days, and when this takes place freely, the straw is removed, watering being continued as before, to force on the plants. In two months they will average from 6 to 8 inches in height when they are planted out. The seed (which is usually from the Annamullais) is selected with the greatest care from trees of the *largest size and also in full vigor*. Mr. Ferguson calculates that one seed in ten germinates, and he insists most strongly on the proper selection of seed as above. I should mention that the beds must be made perfectly level, or if they are not so, ridges must be formed of split bamboos to prevent the water running down and standing in a pool on the lowest end only of the beds; meanwhile the pits are prepared. The pits are 12 inches each way, and are invariably 6 feet (nearly) apart; those of each line alternating with those in the line before it; the lines of pits also being each 6 feet nearly apart. The distance of the pits has been gradually reduced of late years from 9 feet apart to the present rate. The lines are carefully laid off with a 100 feet rope and square, and 1,000 seedlings are planted to each acre. About the 15th of June, when the earth has been thoroughly saturated by the rain, planting out commences. The seedlings in the nurseries should then be from 6 to 8 inches in height. The pits are now filled in with the earth that was taken from them, and each planter carrying a basket of seedlings, makes a slit by inserting his open hand into the mould of the pit, and places one plant in it, closing the earth carefully round the stem. In September or October, after the rains, the young plants are hoed round. Pruning as may be requisite, follows; but after planting, the seedlings do not receive any special care, and no artificial watering is given them, but they are left to shift for themselves.

22. The whole of the plantations, but espe-